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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
ZERVIGON, RUDY	

ART UNIT	PAPER NUMBER
1763	

DATE MAILED: 06/07/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/788,365	NI ET AL.	
	Examiner	Art Unit	
	Rudy Zervigon	1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *04 April 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *25 and 28-45* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *25 and 28-45* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

2. Claims 25, 29, 33, 34, 37, 38, 42, and 45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ishii (USPat. 5,685,942) in view of Li et al (USPat. 5,772,771) and Horie, Kuniaki et al (US 6,132,512 A).

Ishii teaches a conductor gas injector (85, Figure 4) supplying process gas into a plasma processing chamber (82; column 7, line 63 - column 8, line 22) wherein a semiconductor substrate ("W") is subject to plasma processing (column 3, lines 28-50). The gas injector further comprises a gas injector body (85, Figure 4) sized to extend through a chamber wall (83) of the processing chamber. As shown in Figure 4, the axial planar distal end surface (surface containing ports 87) of the gas injector body is exposed within the processing chamber. Figure 4 shows that the gas injector body includes a plurality of gas outlets (87) adapted to supply process gas into the processing chamber.

Ishii teaches alternative materials to conductive, non-dielectric, electrodes which are dielectric semiconductors such as the same materials as that of the processed semiconductor ("quartz") wafer (column 4; lines 43-51).

Figure 4 shows that the gas outlets of the gas injector body (85, Figure 4) are located at an axial end surface (surface containing ports 87) of the gas injector body. The gas outlets further including wherein the gas outlets are located are located in the axial distal end surface of the gas injector body.

Ishii further teaches that the gas injector includes a planar axial end surface (surface containing ports 87; Figure 4) that is flush with an interior surface of a dielectric window (83; "insulating material"; column 8, line 7) forming a chamber wall. Ishii also teaches a surface (flange portion of 85, Figure 4) adapted to overlie an outer surface of the chamber wall.

Ishii does not teach gas outlets further including a plurality of angled gas outlets extending at an acute angle to the axial direction. Ishii further does not teach a pressure difference across his gas injector (85, Figure 4) orifice sustaining gas velocities in excess of sonic gas velocities.

Ishii does not teach a dielectric gas injector body (85, Figure 4).

Li teaches a gas injector (Figure 1A) supplying process gas into a plasma processing chamber (18; column 3, lines 20-47). The gas injector further comprises a gas injector body (56a/64, Figure 1) sized to extend through a chamber wall (25) of the processing chamber.

As shown in Figure 1/1A, the distal end (64) of the gas injector body is exposed within the processing chamber. Figure 1A shows that the gas injector body includes three angled gas outlets (64) adapted to supply process gas into the processing chamber. Figures 1 and 1A shows that the gas outlets (64, Figure 1,1A) of the gas injector body (56, Figure 1) are located at an axial end surface (56) of the gas injector body. Specifically, Li teaches a plurality (3) of angled gas outlets (Figure 1A) extending at an acute angle to the axial direction. Li does not teach 8 angled gas outlets as claimed by claim 43. Li does not teach the acute angle of the gas injector as being between 10° to 70°.

Kuniaki teaches a gas passage (63; Figure 18a,b) within a gas distribution plate (64; Figure 18a) where, depending on the pressure difference ($P_1 - P_2$; column 16; lines 35-40) across Kuniaki's gas passage, gas velocities can be controlled.

It would have been obvious to one of ordinary skill in the art at the time the invention was made for Ishii to optimize the angle of a plurality of his gas outlets, add additional gas outlets as taught by Li, optimize the pressure processing conditions of the Ishii apparatus to produce gas velocities in excess of subsonic gas velocities, and use alternate conductor materials for Ishii's conductor gas injector.

Motivation for Ishii to optimize the angle of a plurality of his gas outlets, add additional gas outlets as taught by Li, optimize the pressure processing conditions of the Ishii apparatus to produce gas velocities in excess of subsonic gas velocities, and use alternate conductor materials for Ishii's conductor gas injector as taught by Li is to process larger area substrates (column 5, lines 19-28), further to optimize the pressure processing conditions of the Ishii apparatus to produce gas velocities in excess of subsonic gas velocities is to process larger area substrates (column 5, lines 19-28), further, motivation to use dielectric electrodes is for preventing metallic contamination as taught by Ishii (column 4; lines 43-51). Further, it is considered obvious to optimize the operation of the claimed apparatus claims respectively. Further, it is well established that the duplication of parts is obvious (In re Harza , 274 F.2d 669, 124 USPQ 378 (CCPA 1960) MPEP 2144.04). With respect to the processing gas velocities and pressure operating conditions, it has been held that claim language that simply specifies an intended use or field of use for the invention generally will not limit the scope of a claim (Walter , 618 F.2d at 769, 205 USPQ at 409; MPEP 2106). Additionally, in apparatus claims, intended use must result

in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim (In re Casey,152 USPQ 235 (CCPA 1967); In re Otto , 136 USPQ 458, 459 (CCPA 1963); MPEP2111.02). Alternatively, it would be obvious to those of ordinary skill in the art to optimize the operation of the claimed invention (In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980); In re Hoeschele , 406 F.2d 1403, 160 USPQ 809 (CCPA 1969); Merck & Co. Inc . v. Biocraft Laboratories Inc. , 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), cert. denied , 493 U.S. 975 (1989); In re Kulling , 897 F.2d 1147, 14 USPQ2d 1056 (Fed. Cir. 1990), MPEP 2144.05).

3. Claims 28, 30-32, 35, 36, 39, 40, 43, and 44 are rejected under 35 U.S.C. 103(a) as being obvious over Ishii (USPat. 5,685,942) and Li et al (USPat. 5,772,771), in view of Rossman et al (USPat. 6,077,357) and Horie, Kuniaki et al (US 6,132,512 A).

Ishii, Li, and Horie are discussed above. Ishii further teaches Ishii's injector body (85, Figure 4) has a cylindrical bore (86+88a; Figure 4) adapted to supply gas to Ishii's gas outlets (87), the cylindrical bore being defined by a sidewall (inner surfaces of 86+88a) and an endwall (bottom surface of 86; Figure 4) which extends radially inwardly from the sidewall – inner surfaces of 86+88a. Ishii further teaches a center gas outlet (86) extending from the endwall (top surface of 86; Figure 4). Ishii, Li, and Horie do not teach a first O-ring seal in a surface of the flange for sealing against the outer surface of the chamber wall. Ishii and Li do not teach a second O-ring seal on an outer surface of the gas injector body. Ishii and Li further do not teach a gas injector for supplying process gas at sonic velocity.

Rossman teaches a gas injection nozzle (302; Figure 14) including a first O-ring seal (326) in a surface of the flange for sealing against the outer surface of the chamber wall (314). Rossman further teaches a second O-ring seal (322, 324; Figure 14) on an outer surface of the gas injector body.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to add an O-ring seal in a surface of the flange for sealing against the outer surface of the chamber wall and to add a second O-ring seal on an outer surface of Ishii's gas injector body, further to optimize the pressure processing conditions of the Ishii apparatus to produce gas velocities in excess of sonic gas velocities, inclusive, for Ishii to have a central bore (88a) which is partly defined at one end at a sidewall.

Motivation to add an O-ring seal in a surface of the flange for sealing against the outer surface of the chamber wall and to add a second O-ring seal on an outer surface of Ishii's gas injector body, and to flow the process gas at sonic velocity as taught by Rossman is to provide for vacuum integrity as taught by Rossman (column 17, lines 54-56), inclusive, motivation for Ishii to have a central bore (88a) which is partly defined at one end at a sidewall is for providing an alternate and equivalent entry point for Ishii's process gasses.

With respect to the processing gas velocities and pressure operating conditions, it has been held that claim language that simply specifies an intended use or field of use for the invention generally will not limit the scope of a claim (Walter , 618 F.2d at 769, 205 USPQ at 409; MPEP 2106). Additionally, in apparatus claims, intended use must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use,

then it meets the claim (In re Casey,152 USPQ 235 (CCPA 1967); In re Otto , 136 USPQ 458, 459 (CCPA 1963); MPEP2111.02). Alternatively, it would be obvious to those of ordinary skill in the art to optimize the operation of the claimed invention (In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980); In re Hoeschele , 406 F.2d 1403, 160 USPQ 809 (CCPA 1969); Merck & Co. Inc . v. Biocraft Laboratories Inc. , 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), cert. denied , 493 U.S. 975 (1989); In re Kulling , 897 F.2d 1147, 14 USPQ2d 1056 (Fed. Cir. 1990), MPEP 2144.05).

4. Claim 41 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ishii (USPat. 5,685,942) and Li et al (USPat. 5,772,771) in view of Kawase et al (USPat. 5,734,143) and Horie, Kuniaki et al (US 6,132,512 A). Ishii and Li are discussed above. Ishii further teach his gas injector (85; Figure 4) including a uniform diameter central bore (88a) extending axially from an upper axial end face (top surface 85) of the gas injector body, the central bore being defined by a cylindrical sidewall and a flat endwall (bottom surface 85).

Ishii and Li do not teach that the inlets of the gas outlets (87) are located on the flat endwall. Ishii and Li do not teach a pressure difference across Ishii's and Li's gas injector orifice sustaining gas velocities in excess of sonic gas velocities.

Kuniaki teaches a gas passage (63; Figure 18a,b) within a gas distribution plate (64; Figure 18a) where, depending on the pressure difference ($P_1 - P_2$; column 16; lines 35-40) across Kuniaki's gas passage, gas velocities can be controlled.

Kawase teaches a plasma torch head nozzle (Figure 2; column 5, line 66 – column 3, line 31). Inclusive, Kawase teaches a gas injector (Figure 2) including a uniform diameter central bore (along axis 70) extending axially from an upper axial end face (top of 11) of the gas injector

body, the central bore being defined by a cylindrical sidewall and a flat endwall (bottom of 11) where the inlets of the gas outlets (10) are located on the flat endwall.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to replace Ishii's injector body with Kawase's injector body, further to optimize the pressure processing conditions of the Ishii apparatus to produce gas velocities in excess of sonic gas velocities.

Motivation to replace Ishii's injector body with Kawase's injector body is to form stable plasmas as taught by Kawase (column 2, lines 10-15), further to optimize the pressure processing conditions of the Ishii apparatus to produce gas velocities in excess of sonic gas velocities is to optimize the operation of the claimed apparatus claims respectively. With respect to the processing gas velocities and pressure operating conditions, it has been held that claim language that simply specifies an intended use or field of use for the invention generally will not limit the scope of a claim (Walter , 618 F.2d at 769, 205 USPQ at 409; MPEP 2106). Additionally, in apparatus claims, intended use must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim (In re Casey,152 USPQ 235 (CCPA 1967); In re Otto , 136 USPQ 458, 459 (CCPA 1963); MPEP2111.02). Alternatively, it would be obvious to those of ordinary skill in the art to optimize the operation of the claimed invention (In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980); In re Hoeschele , 406 F.2d 1403, 160 USPQ 809 (CCPA 1969); Merck & Co. Inc . v. Biocraft Laboratories Inc. , 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), cert. denied , 493

U.S. 975 (1989); In re Kulling , 897 F.2d 1147, 14 USPQ2d 1056 (Fed. Cir. 1990), MPEP 2144.05).

Response to Arguments

5. Applicant's arguments filed April 4, 2005 have been fully considered but they are not persuasive.

6. The affidavit filed on April 4, 2005 under 37 CFR 1.131 has been considered but is ineffective to overcome the cited reference.

7. The evidence submitted is insufficient to establish a conception of the invention prior to the effective date of the patent reference. While conception is the mental part of the inventive act, it must be capable of proof, such as by demonstrative evidence or by a complete disclosure to another. Conception is more than a vague idea of how to solve a problem. The requisite means themselves and their interaction must also be comprehended. See *Mergenthaler v. Scudder*, 1897 C.D. 724, 81 O.G. 1417 (D.C. Cir. 1897). See below.

8. Applicant states that none of the cited prior art teach a "gas injector body of a dielectric material". The Examiner has already stated that Ishii does not teach a dielectric gas injector body (85, Figure 4), however, it has been previously stated that Ishii teaches alternative materials to conductive, non-dielectric, electrodes which are dielectric semiconductors such as the same materials as that of the processed semiconductor ("quartz") wafer (column 4; lines 43-51). Yet, the Examiner has already provided that motivation to use dielectric electrodes is for preventing metallic contamination as taught by Ishii (column 4; lines 43-51). Applicant further states that "the ground electrode 85 is necessarily made of an electrically conductive material.", the Examiner agrees, as this would be required for the intended use of Ishii's gas injector body (85,

Figure 4) that is also used as an electrode. However, it has also been established by Ishii that alternative dielectric materials may also be used as electrode materials as stated above and in prior actions.

9. In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., "Particularly, dielectric materials are electrical insulators, and semiconductor materials have electrical conductivity properties intermediate to those of insulators and conductors.") are not recited in the rejected claims. Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). To this end Applicant appears to indirectly argue ranges of a dielectric property, however, none of the pending claims require a claimed range of a dielectric material property.

10. Applicant states:

"

As discussed above, Ishii would be inoperable if the ground electrode 85 were made of a dielectric material, much less of quartz, alumina or silicon nitride, as claimed. Thus, Ishii does not suggest the gas injector recited in Claim 42.

"

The Examiner has already established the operability of Ishii's gas injector body (85, Figure 4) according to the specific teachings of Ishii who is shown as teaching alternative materials to conductive, non-dielectric, electrodes which are dielectric semiconductors such as the same materials as that of the processed semiconductor ("quartz") wafer (column 4; lines 43-51).

11. Applicant states that Ishii's injector body (85, Figure 4) is structurally different from the instant application. The Examier disagrees. Ishii's injector body (85, Figure 4) has a cylindrical bore (86+88a; Figure 4) adapted to supply gas to Ishii's gas outlets (87), the cylindrical bore (86+88a; Figure 4) being defined by a sidewall (inner surfaces of 86+88a) and an endwall (bottom surface of 86; Figure 4) which extends radially inwardly from the sidewall – inner surfaces of 86+88a.

12. With respect to Applicant's arguments to claim 41, the Examiner agrees that Ishii teaches two dissimilar diameter central bores 86 and 88a of Ishii's gas injector 85. However, in response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986): "It would have been obvious ... to replace Ishii's injector body with Kawase's injector body, ..."

13. Applicant states, with respect to Kawase; Toru et al:

"

The inner conductor 5b shown in FIG. 1 has a gas inlet port 13 (column 6, line 44) extending along the axis 70. However, the gas inlet port 13 is a separate element of the plasma torch from the dielectric plate 11, and thus is not a central bore of the dielectric plate. Moreover, the inlet port 13 is not defined by a cylindrical sidewall and a flat end wall extending between the cylindrical sidewall, inlets of the gas outlets being located on the flat end wall" (emphasis added). In contrast, the bottom end of the inlet port 13 is completely open and the inlet port 13

does not include an end wall extending between the sidewall. The sidewall completely defines the inlet port 13.

"

In response, the Examiner disagrees. The Examiner has already established that Kawase teaches a gas injector (Figure 2) including a uniform diameter central bore (along axis 70) extending axially from an upper axial end face (top of 11) of the gas injector body, the central bore being defined by a cylindrical sidewall and a flat endwall (bottom of 11) where the inlets of the gas outlets (10) are located on the flat endwall.

Conclusion

14. Applicant's amendment necessitated the new grounds of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Rudy Zervigon whose telephone number is (571)

272.1442. The examiner can normally be reached on a Monday through Thursday schedule from 8am through 7pm. The official fax phone number for the 1763 art unit is (703) 872-9306. Any Inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Chemical and Materials Engineering art unit receptionist at (571) 272-1700. If the examiner can not be reached please contact the examiner's supervisor, Parviz Hassanzadeh, at (571) 272-1435.

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